

5       **METHOD FOR REPRODUCING DATA RECORDED ON AN  
INTERACTIVE RECORDING MEDIUM IN CONJUNCTION WITH  
ASSOCIATED AUXILIARY DATA**

**BACKGROUND OF THE INVENTION**

**Field of the Invention**

10       The present invention relates to a method for reproducing A/V data recorded on an interactive recording medium in conjunction with contents data recorded thereon or contents data provided by a contents providing server connected through the Internet.

**Description of the Related Art**

15       High-density optical disks capable of recording large amounts of data are being widely used. The Digital Versatile Disc (DVD), which is a recording medium that is capable of recording large amounts of high-quality video data as well as digital audio data, is one example  
20 of these high-density optical disks.

      The DVD includes a navigation data recording area in which navigation data required for playback control of A/V data is recorded and a data stream recording area in which digital data streams are recorded.

25       When a DVD is loaded into a DVD reproducing apparatus, the DVD reproducing apparatus first reads the navigation data recorded in the navigation data

recording area and stores the navigation data in an internal memory. The DVD reproducing apparatus then begins reproduction of the DVD using the stored navigation data, thereby providing various functions of  
5 the DVD to a viewer.

The development of new interactive DVDs is being progressing rapidly. Unlike the DVD, the interactive DVD (I-DVD) contains additional contents data, which is detailed information about A/V data recorded thereon and  
10 provides the contents data through a user interface. The contents data may be recorded on the I-DVD as html files.

In addition, a method for obtaining additional contents data from a contents providing server connected through the Internet while reproducing A/V data and  
15 contents data recorded on the I-DVD is under discussion. However, a method for effectively managing reproduction of A/V data and contents data responsive to a viewer's request is not yet available.

#### **SUMMARY OF THE INVENTION**

20 It is an object of the present invention to provide a method for reproducing data recorded on an interactive recording medium in conjunction with contents data provided by a contents providing server using navigation information for the contents data also provided by the  
25 contents providing server.

The method for reproducing A/V data recorded on an

interactive recording medium in accordance with the present invention comprises the steps of (a) receiving playback control information for the A/V data from a contents providing server and storing the received  
5 playback control information and (b) presenting the A/V data reproduced from the interactive recording medium in conjunction with additional contents data received from the contents providing server using the stored playback control information.

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#### **BRIEF DESCRIPTION OF THE DRAWINGS**

The accompanying drawings, which are included to provide a further understanding of the invention, illustrate the preferred embodiments of the invention, and together with the description, serve to explain the  
15 principles of the present invention.

In the drawings:

FIG. 1 illustrates an interactive optical disk reproducing apparatus in which the present invention may be advantageously embodied;

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FIG. 2 illustrates the relationship among an A/V data stream, contents navigation information, and contents data files in accordance with the present invention; and

FIG. 3 illustrates an embodiment of contents  
25 navigation information in accordance with the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In order that the invention may be fully understood, preferred embodiments thereof will now be described with reference to the accompanying drawings.

5        FIG. 1 illustrates an interactive optical disk reproducing apparatus in which the present invention may be advantageously embodied. The reproducing apparatus 100 comprises an optical pickup 11, an IDVD system 12, a microcomputer 13, a buffer memory 14, and an Internet  
10 interface 15 through which the apparatus 100 is connected to a contents providing server 300.

The IDVD system 12 includes a DVD engine for reproducing A/V data recorded on an I-DVD 10 and an enhanced navigation (ENAV) engine for reproducing  
15 contents data provided by the contents providing server 300 or contents data recorded on the I-DVD 10.

The IDVD system 12 outputs the contents data in synchronization with the A/V data from the IDVD 10. As shown in FIG. 1, the reproducing apparatus 100 is  
20 connected to the contents providing server 300 through the Internet interface 15 by the mutual operations of the microcomputer 13 and the ENAV engine included in the IDVD system 12.

ENAV contents data, which is additional contents  
25 data associated with the A/V data being reproduced from the I-DVD 10, is downloaded from the contents providing server 300 and then temporarily stored in the buffer

memory 14. The buffer memory 14 can be logically divided into a first buffer (buffer 1) and a second buffer (buffer 2).

The ENAV engine in the IDVD system 12 outputs the A/V data from the I-DVD 10 in synchronization with the ENAV contents data from the I-DVD 10 or outputs the A/V data from the I-DVD 10 in synchronization with the ENAV contents downloaded from the contents providing server 300.

10 The contents providing server 300 provides various ENAV contents data associated with the A/V data recorded on the I-DVD 10 as a plurality of data files and provides ENAV navigation information for synchronizing the A/V data with the data files. The navigation  
15 information may be provided all at once or may be divided into a plurality of pieces and provided one by one when needed.

As shown in FIG. 2, for example, a title of the I-DVD 10 is organized into individual chapters (Chapter#1, Chapter#2, ...) and one or more data files (File#1, File#2, ...) corresponding to each of the chapters are organized as an ENAV unit. Navigation information for managing the data files included in the ENAV unit is provided as ENAV unit information (ENAV\_Unit\_Info).

25 The multiple pieces of ENAV unit information (ENAV\_Unit#1\_Info, ENAV\_Unit#2\_Info, ...) are defined as a linked list and transmitted along with the ENAV

contents data files or transmitted before the ENAV contents data files are sent.

As shown in FIG. 3, the ENAV unit information includes file names of data files included in the associated ENAV unit (File(s) Name), addresses of the data files in the contents providing server 300 (File(s) Address), the presentation time of the associated ENAV unit (ENAV\_Unit\_Presentation\_Time), and the total size of data files included in the next ENAV unit (Next\_ENAV\_Unit\_Total File(s) Size).

The microcomputer 13 controls the DVD engine and the ENAV engine included in the IDVD system 12 using the ENAV unit information of the linked list provided by the contents providing server 300.

The microcomputer 13 correlates chapters of the A/V data stream reproduced by the DVD engine with data files reproduced by the ENAV engine using the fields of 'File(s) Name' and 'File(s) Address' included in the ENAV unit information.

In addition, the microcomputer 13 estimates the total presentation time of the ENAV unit being reproduced and determines if the total size of data files of the next ENAV unit exceeds the size of the remaining space of the memory buffer 14 using the fields of 'ENAV\_Unit\_Presentation\_Time' and 'Next\_ENAV\_Unit\_Total File(s) Size' included in the ENAV unit information. If the presentation of the ENAV unit

being reproduced requires quite a long time and the memory buffer 14 has no remaining space, the microcomputer 13 sends a command to the contents providing server 300 to delay the transmission of the next ENAV unit data files by the contents providing server 300 for a prescribed time, for example, 1/2 of the estimated total presentation time of the current ENAV unit.

If the total size of data files of the next ENAV unit exceeds the size of the remaining space of the memory buffer 14, the microcomputer 13 sends a command to the contents providing server 300 for requiring that the contents providing server 300 transmit the data files of the next ENAV unit sequentially by organizing them into several groups or compress the data files before transmission so that the total size of the compressed data files may become less than a prescribed limit.

If the data files are compressed to be transmitted, the microcomputer 13 may present a desired compression rate to the contents providing server 300. For example, if the data files of the next ENAV unit need to be compressed by more than 30 % to be stored in the memory buffer 14, the microcomputer 13 sends a desired compression rate of 30 % to the contents providing server 300. If the compression rate is achievable, the contents providing sever 300 provides the data files after compression. Otherwise, the contents providing

server 300 organizes the data files of the next ENAV unit into several groups and provides the groups sequentially.

By the aforementioned procedure, the interactive  
5 optical disk reproducing apparatus 100 can reproduce A/V data from the I-DVD 10 in conjunction with the ENAV contents data provided by the contents providing server 300.

One ENAV unit may correspond to more than one  
10 chapter and one chapter may correspond to more than one ENAV unit. The linked list may include other navigation information as well as the ENAV unit information and may be defined as other names such as ENAV playlist.

The method for reproducing data recorded on an  
15 interactive recording medium in conjunction with associated auxiliary data in accordance with the present invention allows synchronized reproduction of data from different sources in an interactive optical disk reproducing apparatus.

20 While the invention has been disclosed with respect to a limited number of embodiments, those skilled in the art, having the benefit of this disclosure, will appreciate numerous modifications and variations therefrom. It is intended that all such modifications  
25 and variations fall within the spirit and scope of the invention.